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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER

HANNAHER, CONSTANTINE

ART UNIT PAPER NUMBER

2878

DATE MAILED: 04/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/920,235

Applicant(s)

SMITH ET AL.

Examiner

Constantine Hannaher

Art Unit

2878

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 54-60 is/are allowed.
- 6) ☒ Claim(s) 1-12, 15, 16 and 24-53 is/are rejected.
- 7) ☒ Claim(s) 13, 14 and 17-23 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 03 October 2001 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on ____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☒ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) ____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION**Information Disclosure Statement**

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered.

2. As set forth in MPEP § 609:

37 CFR 1.98(b) requires that each item of information in an IDS be identified properly. U.S. patents must be identified by the inventor, patent number, and issue date. U.S. patent application publications must be identified by the applicant, patent application publication number, and publication date. U.S. applications must be identified by the inventor, the eight digit application number (the two digit series code and the six digit serial number), and the filing date. If a U.S. application being listed in an IDS has been issued as a patent, the applicant should list the patent in the IDS instead of the application. Each foreign patent or published foreign patent application must be identified by the country or patent office which issued the patent or published the application, an appropriate document number, and the publication date indicated on the patent or published application. Each publication must be identified by publisher, author (if any), title, relevant pages of the publication, date and place of publication. The date of publication supplied must include at least the month and year of publication, except that the year of publication (without the month) will be accepted if the applicant points out in the information disclosure statement that the year of publication is sufficiently earlier than the effective U.S. filing date and any foreign priority date so that the particular month of publication is not in issue. The place of publication refers to the name of the journal, magazine, or other publication in which the information being submitted was published.

Oath/Declaration

3. The oath or declaration is defective. A new oath or declaration in compliance with 37 CFR 1.67(a) identifying this application by application number and filing date is required. See MPEP §§ 602.01 and 602.02.

The oath or declaration is defective because:

It does not identify the mailing or post office address of each inventor. A mailing or post office address is an address at which an inventor customarily receives his or her mail and may be either a home or business address. The mailing or post office address should include the ZIP Code designation. The mailing or post office address may be provided in an application data sheet or a supplemental oath or declaration. See 37 CFR 1.63(c) and 37 CFR 1.76.

Drawings

4. The corrected or substitute drawings were received on October 3, 2001. These drawings are not acceptable.
5. The drawings are objected to because in Fig. 3, the unit symbol cm^2 has been used to represent wavenumbers. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

6. Applicant is reminded of the proper language and format for an abstract of the disclosure.

The abstract should be in narrative form and generally limited to a single paragraph on a separate sheet within the range of 50 to 150 words. It is important that the abstract not exceed 150 words in length since the space provided for the abstract on the computer tape used by the printer is limited. The form and legal phraseology often used in patent claims, such as "means" and "said," should be avoided. The abstract should describe the disclosure sufficiently to assist readers in deciding whether there is a need for consulting the full patent text for details.

The language should be clear and concise and should not repeat information given in the title. It should avoid using phrases which can be implied, such as, "The disclosure concerns," "The disclosure defined by this invention," "The disclosure describes," etc.

Note the use of "The subject invention..." and "a novel combination..."

7. The disclosure is objected to because it contains an embedded hyperlink and/or other form of browser-executable code. Applicant is required to delete the embedded hyperlink and/or other form of browser-executable code. See MPEP § 608.01.

The examiner notes that the embedded hyperlinks on pages 3-5 of the specification are repetitive and flawed.

Claim Objections

8. Claims 18, 19, 21, 22, and 37 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. By reciting a replacement the scope of claim 18 no longer includes an aircraft. By reciting a replacement the scope of claim 21 no longer includes an aircraft. By requiring all cells to be triangular the scope of claim 37 no longer includes that all cells are trapezoidal. The balance of the claims is objected to on the basis of their dependence.

9. Claim 38 is objected to because of the following informalities: there is a superfluous period in the subscript to the atomic symbol for oxygen, the molecular symbol for methane is improperly expressed, and the claim recites two sentences. Appropriate correction is required.

10. Claims 48 and 49 are objected to because of the following informalities: the molecular symbol for methane is improperly expressed. Appropriate correction is required.

11. Claim 23 is objected to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim should refer to other claims in the alternative only. See MPEP § 608.01(n).

Accordingly, the claim has not been further treated on the merits.

Claim Rejections - 35 USC § 102

12. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

13. Claim 53 is rejected under 35 U.S.C. 102(b) as being clearly anticipated by Zwick (US004543481A).

With respect to independent claim 53, Zwick discloses a method corresponding to the illustrated apparatus (Fig. 1) for measuring the properties (*e.g.*, concentration) of a mixture of different atmospheric gases which would comprise the steps of (a) passing infrared radiation from a gas mixture under study (air above a natural gas pipeline) through a first gas (in cells 1 and 4) capable of absorbing in a characteristic manner infrared radiation emanating from a corresponding first gas in the atmosphere (column 3, lines 37-39); (b) passing infrared radiation from a gas mixture under study (air above a natural gas pipeline) through a second gas (in cells 3 and 6) capable of absorbing in a characteristic manner infrared radiation emanating from a corresponding second gas in the atmosphere (column 3, lines 39-41); (c) detecting (with detector 19a) and analyzing (with microprocessor 50) the spectral and energy content of the radiation passed by the first gas; and (d) detecting (with detector 19b) and analyzing (with microprocessor 50) the spectral and energy content of the radiation passed by the first gas.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the

contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claims 1-12, 15, and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandsten *et al.* (2000) in view of Zwick (US004543481A) and Moore *et al.* (US005656813A).

With respect to independent claim 1, Sandsten *et al.* discloses a gas correlation camera (Fig. 6) comprising a gas correlation cell filled with a first gas capable of absorbing infrared radiation at one infrared band and a camera with imaging optics for determining the spectral and energy content of the first infrared band. Sandsten *et al.* discloses that the gas correlation cell may be filled with a second gas capable of absorbing infrared radiation at another infrared band, in view of Figs. 7 (ammonia), 8 (ethylene), and 9 (methane). Zwick shows that the provision of at least three gas correlation cells, one cell (*e.g.*, 1) filled with a first gas and another cell (*e.g.*, 3) filled with another gas and a third cell that does not absorb infrared radiation (column 3, lines 35-37) is known. In view of the desire of Sandsten *et al.* to analyze a scene for multiple gases, and the suggestion of Zwick that multiple gas correlation cells may be interposed in the operation of a gas correlation instrument, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the single gas correlation cell in the camera of Sandsten *et al.* with at least three such cells as suggested by Zwick. The IR camera of Sandsten *et al.* would determine the spectral and energy content of both infrared bands represented by the multiple gas correlation cells suggested by Zwick using the third cell as a null energy content reference as a substitute for the dual imaging of the telescope which could be made smaller as a consequence. Although the IR camera of Sandsten *et al.* is a one-dimensional array detector (page 98) the use of a two-dimensional array detector for

imaging a scene in the infrared requires no citation. However, Moore *et al.* teaches (column 4, lines 41-46) that a scanning camera and an array camera are equivalent for the purpose of imaging gas cloud 10. Accordingly, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the one-dimensional array detector in the camera of Sandsten *et al.* with a two-dimensional array detector as suggested by Moore *et al.* since they are functionally equivalent.

With respect to dependent claim 2, the at least three cells suggested by Zwick are retained in proximity on a cell retaining plate 11 and the plate 11 suggested by Zwick is linked to a source 12 of motive power for movement. In replacing the single cell of the camera of Sandsten *et al.*, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the plate 11 suggested by Zwick would move the at least three cells separately sequentially into a measurement position (as seen in Fig. 6 of Sandsten *et al.*) relative to the imaging optics of the camera.

With respect to dependent claim 3, the plate 11 suggested by Zwick is a disc (Fig. 2) rotatable about a pivot.

With respect to dependent claim 4, the cells in the plate 11 suggested by Zwick are arrayed in a regularly spaced angular alignment (Fig. 2). When combined with the IR camera of Sandsten *et al.* instead of the two one-dimensional detectors of Zwick, it would have been obvious to position all the cells as cells 2 and 5, that is, approximately equidistant from the center of the plate 11 so that the camera would have the full benefit of each cell as it passed.

With respect to dependent claim 5, the gas correlation cell in the camera of Sandsten *et al.* is positioned in front of the imaging optics of the camera. In replacing the cell with the plate 11

suggested by Zwick, it would have been obvious to one of ordinary skill in the art at the time the invention was made to retain the positioning of the cells.

With respect to dependent claim 6, the filtering in the camera of Moore *et al.* positions the filter plate 28 (Fig. 2) in the optical train (after lens 26) of the camera. In view of the equivalent performance in delivering spectrally filtered images to the camera, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the plate 11 suggested by Zwick may be placed in the optical train, especially since the presence of cells 2 and 5 in Zwick renders the other image delivered by the telescope in Sandsten *et al.* moot.

With respect to dependent claims 7-9, the shape of the gas correlation cells in the gas correlation camera suggested by Sandsten *et al.* and Zwick and Moore *et al.* is a choice within the ordinary skill in the art at the time the invention was made in view of such concerns as cell integrity, camera field of view, and the like. The areas between the cells suggested by Zwick are absorptive (using mask 7).

With respect to dependent claim 10, the gas chosen by Sandsten *et al.* includes one of the recited gases (methane, see Fig. 9) and the gas chosen by Zwick includes another of the recited gases (claim 3).

With respect to dependent claim 11, in view of the gas correlation technique applied to N₂O in the instrument of Zwick, at least one of the absorptive cells would absorb infrared radiation in the recited range.

With respect to dependent claim 12, in view of the gas correlation technique applied to methane in the camera of Sandsten *et al.*, at least one of the absorptive cells would absorb infrared radiation in the recited range (Fig. 2).

With respect to independent claim 15, the gas correlation camera suggested by Sandsten *et al.*, Zwick, and Moore *et al.* as applied to claim 1 above would perform a method for measuring the two-dimensional spatial distribution of a mixture of different atmospheric gases having the recited steps in view of the three chambers of Zwick, the analysis of Sandsten *et al.* using a non-absorbing path as a reference, and the two-dimensional array detector of Moore *et al.*

With respect to independent claim 16, Sandsten *et al.*, Zwick, and Moore *et al.* as applied to claim 1 suggest a system of the recited type in view of the aircraft carrying the gas correlation instrument of Zwick (column 2, line 48).

17. Claims 24-30, 32-37, 39, 40, 38, and 41-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sandsten *et al.* (2000) in view of Zwick (US004543481A).

With respect to independent claim 24, Sandsten *et al.* discloses a gas correlation camera (Fig. 6) comprising a gas correlation cell filled with a first gas capable of absorbing infrared radiation at one infrared band and a camera with imaging optics for determining the spectral and energy content of the first infrared band. Sandsten *et al.* discloses that the gas correlation cell may be filled with a second gas capable of absorbing infrared radiation at another infrared band, in view of Figs. 7 (ammonia), 8 (ethylene), and 9 (methane). Zwick shows that the provision of at least two gas correlation cells, one cell (*e.g.*, 1) filled with a first gas and another cell (*e.g.*, 3) filled with another gas is known. In view of the desire of Sandsten *et al.* to analyze a scene for multiple gases, and the suggestion of Zwick that multiple gas correlation cells may be interposed in the operation of a gas correlation instrument, it would have been obvious to one of ordinary skill in the art at the time the invention was made to replace the single gas correlation cell in the camera of Sandsten *et al.* with at least two such cells as suggested by Zwick. The IR camera of Sandsten *et al.* would determine the

spectral and energy content of both infrared bands represented by the multiple gas correlation cells suggested by Zwick.

With respect to dependent claim 25, the at least two cells suggested by Zwick are retained in proximity on a cell retaining plate 11.

With respect to dependent claim 26, the plate 11 suggested by Zwick is linked to a source 12 of motive power for movement. In replacing the single cell of the camera of Sandsten *et al.*, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the plate 11 suggested by Zwick would move the at least two cells separately sequentially into a measurement position (as seen in Fig. 6 of Sandsten *et al.*) relative to the imaging optics of the camera.

With respect to dependent claim 27, a third of the cells in the plate 11 suggested by Zwick (*e.g.*, 2) does not absorb infrared radiation (column 3, lines 35-37).

With respect to dependent claim 28, the plate 11 suggested by Zwick is a disc (Fig. 2) rotatable about a pivot.

With respect to dependent claim 29, the cells in the plate 11 suggested by Zwick are arrayed in a regularly spaced angular alignment (Fig. 2). When combined with the IR camera of Sandsten *et al.* instead of the two one-dimensional detectors of Zwick, it would have been obvious to position all the cells as cells 2 and 5, that is, approximately equidistant from the center of the plate 11 so that the camera would have the full benefit of each cell as it passed.

With respect to dependent claim 30, the gas correlation cell in the camera of Sandsten *et al.* is positioned in front of the imaging optics of the camera. In replacing the cell with the plate 11 suggested by Zwick, it would have been obvious to one of ordinary skill in the art at the time the invention was made to retain the positioning of the cells.

With respect to dependent claims 32-37 (treating claim 37 as if it depended on claim 36), the shape of the gas correlation cells in the gas correlation camera suggested by Sandsten *et al.* and Zwick is a choice within the ordinary skill in the art at the time the invention was made in view of such concerns as cell integrity, camera field of view, and the like.

With respect to dependent claim 39, in view of the gas correlation technique applied to N_2O in the instrument of Zwick, at least one of the absorptive cells would absorb infrared radiation in the recited range.

With respect to dependent claim 40, in view of the gas correlation technique applied to methane in the camera of Sandsten *et al.*, at least one of the absorptive cells would absorb infrared radiation in the recited range (Fig. 2).

With respect to dependent claim 38, the gas chosen by Sandsten *et al.* includes one of the recited gases (where CH_3 is understood to mean CH_4 , methane, see Fig. 9) and the gas chosen by Zwick includes another of the recited gases (claim 3).

With respect to independent claim 41, Zwick discloses a gas cell retaining plate 11 fitted with at least two cells of gas (*e.g.*, 1 and 3) capable of absorbing infrared radiation in different bands and a cell (*e.g.*, 2) incapable of absorbing infrared radiation and having one or more absorptive areas 7 and, as applied to claim 24 above, positioned in line with the optical axis of the optical imaging train of the infrared camera of Sandsten *et al.*

With respect to dependent claims 42-47, the shape of the gas correlation cells in the gas correlation camera suggested by Sandsten *et al.* and Zwick is a choice within the ordinary skill in the art at the time the invention was made in view of such concerns as cell integrity, camera field of view, and the like.

With respect to dependent claims 48 and 49, the gas chosen by Sandsten *et al.* includes one of the recited gases (where CH₃ is understood to mean CH₄, methane, see Fig. 9) and the gas chosen by Zwick includes another of the recited gases (claim 3).

With respect to dependent claim 50, in view of the gas correlation technique applied to N₂O in the instrument of Zwick, at least one of the absorptive cells would absorb infrared radiation in the recited range.

With respect to dependent claim 51, in view of the gas correlation technique applied to methane in the camera of Sandsten *et al.*, at least one of the absorptive cells would absorb infrared radiation in the recited range (Fig. 2).

With respect to dependent claim 52, in view of the gas correlation technique applied to N₂O in the instrument of Zwick, at least one of the absorptive cells would absorb infrared radiation in the recited range.

18. Claim 31 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sandsten *et al.* (2000) and Zwick (US004543481A) as applied to claim 29 above, and further in view of Moore *et al.* (US005656813A).

With respect to dependent claim 31, the filtering in the camera of Moore *et al.* positions the filter plate 28 (Fig. 2) in the optical train (after lens 26) of the camera. In view of the equivalent performance in delivering spectrally filtered images to the camera, it would have been obvious to one of ordinary skill in the art at the time the invention was made that the plate 11 suggested by Zwick may be placed in the optical train, especially since the presence of cells 2 and 5 in Zwick renders the other image delivered by the telescope in Sandsten *et al.* moot.

Allowable Subject Matter

19. Claims 54-60 allowed.

20. Claims 13, 14, and 17-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

21. The following is a statement of reasons for the indication of allowable subject matter: measurement at two different absorption bands of a single gas is not suggested; the repetitive taking of images of the types recited is not suggested; the tomographic sounding comprising an aerospace vehicle is not suggested.

Conclusion

22. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Parnoff *et al.* (EP000241522B1) discloses trapezoidal filters (Fig. 2).

23. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Constantine Hannaher whose telephone number is (703) 308-4850. The examiner can normally be reached on Monday-Friday with flexible hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David P. Porta can be reached on (703) 308-4852. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9318 for regular communications and (703) 872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

ch
April 22, 2003


Constantine Hannaher
Primary Examiner